Lessons from private financing of transport infrastructure. Dutch infrastructure in the 19th century and European projects in the 20th century

Rienstra, S.A.; Nijkamp, P.

published in
Revue Économique
1997

DOI (link to publisher)
10.2307/3502537

document version
Publisher's PDF, also known as Version of record

SERIE RESEARCH MEMORANDA

Lessons From Private Financing of Transport Infrastructure: Dutch Infrastructure in the 19th Century and European Projects in the 20th Century

Sytze A. Rienstra
Peter Nijkamp

Research Memorandum 1996-13

April 1996

vrije Universiteit *amsterdam*

Lessons from Private Financing of Transport Infrastructure:

Dutch Infrastructure in the 19th Century

and European Projects in the 20th Century

Sytze A. Rienstra **Peter Nij kamp**

De Boelelaan 1105
1081 HV Amsterdam
The Netherlands

tel: x-3 1-20-4446096
fax: x-3 1-20-4446005
e-mail: srienstra@econ.vu.nl

free University ***amsterdam***
Dept. of Spatial Economics

March 1996

Abstract

In the past decade serious doubts have been expressed on the efficiency of a strong public financial involvement in infrastructure. This provokes the question whether financing of infrastructure should be a task of the government. For this purpose, the paper first presents a concise theoretical overview under which circumstances there is a case for public intervention.

Interestingly, the financing and operation of transport infrastructure has not always been the task of the public sector. In the 19th century, the railway infrastructure in Europe was financed and operated by the private sector. Later, the govemment took over more and more responsibilities. This paper analyses then for the Netherlands the reasons for the govemment to take over the financing of infrastructure, in order to draw conclusions for the present and the future.

Also in the 20th century many European projects have been privately financed. In the third part of the paper an overview is presented of several projects (e.g., Channel Tunnel, Mont Blanc Tunnel, Dartford Bridge, Dutch tunnels, Storebelt, etc.) as well as an analysis of the circumstances under which these are economically successful and politically feasible.

It is concluded that the influence of governments will - and should - remain substantial because of economic, politica1 and environmental reasons. However, (some degree of) private financing is an interesting option for transport infrastructure in various cases.

1 Introduction

It is clear that there is - and should be - a large difference in the financial and socio-economie targets and democratic responsibilities of the private and the public sector. As a result, there are several reasons for the government to intervene in the economy and to assume responsibility for the provision of several goods. It may be clear that pure collective goods (like defence) are normally an exclusive governmental responsibility. When the use of a good is competitive however (as is the case with infrastructure), this good may in principle be provided by the private sector as well.

The question in how far goods should be provided by the private sector may be analyzed by using the transaction costs approach. Transaction costs include those of e.g. negotiating, making contracts, control and requiring information. Within the Coase-theorem of a world without transaction costs there is no efficiency difference between provision by either the public or the private sector, because negotiations continue until there is a Pareto-optimal allocation of goods (Coase, 1988). In reality however, there are of course many kinds of transaction costs. A good should now be provided by that sector which can offer this good against the lowest transaction costs. For 'normal' goods, provision by the private sector will usually be optimal. For some goods however, this may not be the case, which may justify public intervention. There are several reasons for governments to intervene in the market (Fokkema and Nijkamp, 1994):

* the **'infant industry'** and **'infant region'** argument; in an initial stage of industrial or regional development the economic basis of a sector or region is too weak to be competitive and to survive, and therefore economic actors should be protected temporarily;
* the **market failure** argument; a market system does not always result in a Pareto-optimal allocation. There are several causes of such market failures which may also hold for transport infrastructure:
  - **imperfect competition;** infrastructure is an example of this situation, because it is in most cases not efficient to operate two links on the same corridor. Also the special network character of infrastructure causes imperfect competition: one given link may contribute to the profitability of other links, and therefore an unprofitable link may be profitabie when the impact on the total network is taken into account;
  - **absence of markets**; governments intervene in transport to eliminate negative extemalities or to generate positive extemalities;

* the **ethics and justice** argument; an obvious example is the provision of non-profitable public transport, because the government wants to provide a minimum mobility level for everyone at reasonable fares.

However, it seems that in recent years all these arguments have lost part of their validity (Nijkamp and Rienstra, 1996). Most countries abolish support for industries and regions, while most backward regions are already provided with high quality infrastructure (at least in Western-Europe). At the same time, there is competition of other modes, while for example for highways there is a huge underlying network avaiiable. Negative extemalities are more and more coped with in a market-based way, while new teclmologies make levying tolls much cheaper (e.g., road pricing technologies). Also for the provision of public transport, market incentives are introduced and competition between market parties is increasingly allowed. At the same time it is widely acknowledged that provision by the public sector also causes costs - the so-called governrnent failures - because this makes provision of goods more inefficient and is largely influenced by e.g. pressure groups.

It may be concluded that there are stil1 various reasons for governments to intervene in the transport sector, especially for environmental reasons and in order to integrate markets by constructing infrastructure. However, the perceived necessity for govemments to intervene has clearly been reduced. At the same time govemment budgets are stil1 tight, while most govemments want to increase investments in transport infrastructure (the Trans-European Networks, High Speed Train networks, conventional rail and road infrastructure, etc.) in order to solve congestion problems and to stimulate economic growth. As a result private financing of transport infrastructure may be an interesting option.

In this paper it will be analysed whether and under which conditions the private sector is able and prepared to finance transport infrastructure. The paper is built up as follows. In Section 2 a concise theoretical overview will be presented on the financing of transport infrastructure; also conditions will be identified which should be met when a concession is granted. Next, the financing of Dutch infrastructure in the 19th century will be discussed in Section 3 and will be confronted with the conditions found in Section 2. The same holds for the analysis in Section 4, which contains a cross-European overview of various privately financed projects. In Section 5 conclusions will be drawn.

2 Private Financing of Infrastructure; a Theoretical Overview

2.1 Characteristics of investments in infrastructure

Investments in infrastructure may differ from competing investments such as immovables and capita1 goods in several ways (Nijkamp and Rienstra, 1995). Especially the high investment costs and the long construction and planning periods may make an investment very unattractive for a private investor, because in the beginning of a project a lot of capita1 is needed, while the pay-back period is very long. As a result the interest costs are very high at the beginning of a project, while the cash-flow and the return on investments are low. In most cases there are no revenues at all before the operation starts. When it starts, the profits tend to increase over time, because more repayments are made, which reduce the interest costs. The problem is that these high profits and revenues often start decades after the initial investment, which make the uncertainty and the risks of infrastructure projects very high.

In practice however, it is very well possible that there is no profit at all (Nijkamp and Rienstra, 1995). The construction costs of infrastructure are (up to a certain leve1 of demand/transport) fixed costs; the other costs are partly fixed and partly variable. From this it follows that compared to competing investments fixed costs in infrastructure are very high for an investor, while variable and marginal costs are relatively low. When the price in this case is set according to the marginal costs, it is often not possible to make a satisfactory return on investment .

2.2 Risks of investments in infrastructure

Risks are included in all kinds of investments, but for investments in infrastructure these are particularly high. This is the result of the long pay-back period, which makes it difficult to make good estimations of revenues (ECMT, 1990).

The politica1 risks are the most important difference compared to altemative investments, however. In practice, govemments always wish to influence the planning of infrastructure, because of the important positive and negative extemal effects and the national importance of high quality infrastructure. There is always also a danger of changes in laws or new regulations or even of nationalisation, since a change in transport policy may influence the charges which can be asked as well as the competition by other modes.

The expected costs and revenues are of course important for the calculation of the return on investments. It appears to be very difficult to estimate the costs of construction of major infrastructure projects, however. Therefore, the projects are often much more expensive than estimated beforehand. This problem arises especially when the project is a completely new transport mode or when new technologies are used. Then many costs are not known at the outset of the project and the estimates appear to be too low in almost all cases.

Another important cause of rising costs are relatively expensive solutions, chosen to cope with resistance in society, e.g., to avoid external effects (this may lead e.g., to (half-)subterranean infrastructure and noise-shields). It is however, very important that the cost estimates are made on a reliable basis; otherwise, it will be impossible to assess the economic viability of the project. And if no return on investment can be calculated, private investors might withdraw.

In conclusion, the risks of infrastructure investments are very high compared Co alternative investment opportunities; this in turn makes these investments unattractive for private investors.

2.3 A classification of private involvement

Private involvement in infrastructure provision may occur in several ways. It is useful to make a clear distinction between financing and operation of infrastructure. The possible ways of infrastructure are indicated in Figure 1, although in practice the distinction may sometimes be less straightforward.

		financing	
		Private	Public
operation	Private	1	11
	Public	111	IV

Figure 1 Different focus of public-private sector involvement
Source Nijkamp and Rienstra (1995)

The first category (I) refers to a situation where infrastructure is regarded as a normal good with normal market prices. There is no public intervention. The airline sector in the US is an example of this situation. As seen in Section 1, this situation may in economic terms not be optimal in various cases.

In the second category (11) the infrastructure will be efficiently operated, while the government only has to pay the fixed infrastructure costs and not the variable operating costs.

The next category (111) concerns a situation where the private sector finances the infrastructure, but where the public sector is charged with the operating costs.

Finally , category IV is a common situation in conventional road and waterway infrastructure. Financing and operation are under control of the government.

It is clear that most economic benefits may be found in the operation of the infrastructure, and therefore government policy should aim at achieving this. The financing however, may as a consequence (partly) be private, when the expected operational profits are high enough.

As argued by Nijkamp and Rienstra (1995), two conditions have to be met for private financing possibilities:

* the private investor should take the risks of the investment (at least to a large extent);
* user charges should be levied.

The first condition is, for example, not met when the govemment provides guarantees for the pay-back of loans. When the govemment guarantees loans, it runs the risks instead of the private investor, while possible additional revenues are handed over to the private investor. In this way there are also less incentives to provide the infrastructure efficiently. In conclusion, such a model is not economically feasible and is therefore in the long run unattractive for govemments.

Next, levying user charges, e.g. by introducing toll or road pricing, is also a necessary condition. An altemative is that the govemment compensates the investor from the public budget, e.g. by providing a revenue per passing car. In this case however, the govemment accepts long term obligations, while the private investor will ask a considerable risk premium. Therefore, the costs for the government will be much higher than with public financing, while the government stil1 pays for the project out of the public budget. From this argumentation, it may be concluded that private financing is only feasible when there are considerable revenues from user charges. Private operation and management is therefore a sine qua non for private financing, while this relationship does not hold in the opposite direction.

As a result, concessions in Category 111 of Figure 1 are not economically useful. However, such constructions may politically be very attractive, because the funding of the investment can be postponed, while the public control over

the infrastructure is not reduced. In the end however, such a construction is more expensive for governments, because the interest rates for private financiers are higher, while there are no efficiency gains in the operation. Therefore, such a construction is more expensive for governments.

2.4 Public private cooperation

It may be clear that in theory transport infrastructure may be provided by the private sector. In practice however, the influence of governments tends to be high, not only because of the strategic importance and the specific characteristics of infrastructure, but also because of various environmental and equity issues involved. As a result, private financing and operation in practice faces many problems. Therefore, joint ventures may be an interesting option by combining the advantages of both regimes. In such joint undertakings the above mentioned conditions should of course be met, while market incentives should be introduced to a maximum extent in order to achieve an efficient management and to reduce the transaction costs of infrastructure provision.

In many cases private sector' involvement tends to be introduced by franchising (Andersen, 1995; Nash, 1993). A franchise can be defined as a contract between a transport authority (the franchiser) and a private company (the franchisee), by which the latter obtains the right to operate a transport system. Under a conventional franchise contract, the franchisee pays the franchiser for using his property rights. In the case of transport infrastructure, this situation may be reversed: the transport authority may compensate the private company for an expected operational deficit. These franchise contracts may be allocated by means of tendering. There may be two different kinds of contracts: a given transport system is transferred to the company which offers to operate it at the lowest costs or the contract is transferred to the company which offers the best transport system for a given budget.

Next we will discuss private involvement in practice, in order to analyze to which extent the conditions and observations in this Section hold. First in Section 3, the Dutch transport infrastructure financing in the 19th century will be discussed. Section 4 focuses on major European projects.

3 A Historica1 Sketch of the Netherlands in the 19th Century

In this section a short historica1 sketch of the ways various transport infrastructure modes in the Netherlands have been financed will be presented. We will deal with waterways, railways and roads, respectively.

3.1 Waterways

Inland waterways have traditionally been one of the most important transport activities in the Netherlands. Not only the rivers, but also man-made canals formed an essential part of Dutch transport infrastructure. In particular, the horse drawn barges were important vehicles for both passengers and goods (Vries, 1981). The construction of canals started already in the seventeenth century and continued until the beginning of this century.

The canals were mainly financed by the cities, connected by these waterways. These cities created special societies aiming at commercial use of the canals. This decentralized system was mainly based on a toll system, so that at the end the user had to pay for it. Given the high profitability of many canals, various cities were very keen on expanding the inland waterways system. The operation of the canals was usually a joint responsibility of shippers' associations (guilds).

In the nineteenth century the construction of large canals started. In the beginning these canals were financed and operated by private companies, while the govemment granted concessions. Also govemments participated in these companies. The number of large canals constructed however, was rather limited. Therefore, the centra1 govemment started to finance the canals. Especially King Willem 1 was pushing the construction of these canals, which were sometimes even partly financed by his own private capital. He also sometimes provided capita1 without informing the parliament, which was often opposing the large investments. Later on, the centra1 govemment financed more and more canals and the involvement of the private sector reduced (Tijn and Zappey, 1979). In 1868 the Mannheim Treaty was signed with the other Rhine countries. According to this treaty it was forbidden to levy tolls and to discriminate shippers of other countries; this holds also for canals linked to the Rhine. As a result, private financing of most canals was not possible anymore for most canals. In practice, only regional canal networks were still privately financed.

In the twentieth century the centra1 govemment became the only financier of new infrastructure. The toll systems were gradually abolished, and most smal1 regional canals were closed or remained only open for recreational purposes.

3.2 Railways

Since 1830, the development of railways led to a new phase in the evolution of modern infrastructure in the Netherlands. Three stages can be identified in the private sector involvement in the railways.

The first stage (1830-1860)

In the first stage (until 1860) all railways were developed on a private-commercial basis (Category 1 of Figure 1). The government did not consider it as a public responsibility to provide railway services, although the govemment had to give concessions and also gave support by confiscating land. Initially, the railway companies had to give financial compensations to horse-drawn barges and carriages in order to reduce resistance of competing interest parties. Two large and several smal1 privately owned companies came into existence. The most profitable links - which were constructed near the most profitable waterways - were opened in this period (Jonkers Nieboer, 1938). Interestingly, in the concession granted by the govemment it was stated that third parties could use the infrastructure when a user fee was paid; nowadays this possibility is again an often mentioned option. Also maximum tariffs were controlled by the government. In general, it appeared that the profits of the companies were relatively low.

The second stage (1860-1890)

The construction of links largely stopped when the most profitable links were constructed. Therefore, the public involvement increased in the second stage (1860-1890), also because the equity objective started to play an important role; various cities were not connected to the new railway infrastructure as such links were not commercially feasible. The development of the railways was also lagging behind the development in other European countries, where the construction of new railways was much more supported by the govemments. Therefore, in this new stage the govemment took upon itself the responsibility to build expansions of the railway system for less profitable sections. The exploitation of these new links rested however stil1 with private companies (sometimes subsidized by the govemment). This situation corresponds with Category IV in Figure 1. Interestingly, this way of operation is now proposed by the EU and several countries as the new regime, under which the railway companies should operate. In this period the railway network was expanded very fast: in 1860 there was 339 km of infrastructure, in 1889 this increased to 2620 km (Bierman et al., 1982). In general, the network was in 1890 about the same as today .

The third stage (1890-1940)

More and more problems occurred because of the segmented operation of the network. At the same time the network was expanded with many local railway links, which were not profitable (these were mostly closed a few decennia later). To cope with these problems, the govemment forced the companies in the **next stage** (1890-1940) to integrate the network, in order to benefit from network synergy. First, two companies were left, which only competed in the densely populated West of the country. This system was not working very well, and therefore one national railway company (the Dutch Railways) was created in the end which had a monopoly position, but at the same time the company had a duty for operating and transport on all designated links of the network. This social equity objective meant in practice that it became almost impossible to operate the railway system on a commercial basis. Therefore, the government became increasingly involved in this company and covered the loss and guaranteed loans.

The post-war stage

In the **post-war stage** the Dutch Railways participated also in regional bus transport. Because the company started at a financially healthy basis in 1945, the company was able to operate the network in a profitable way. Gradually however, the company entered a stage of structural deficits which were covered by the govemment. Since 1985 the Dutch Railways have to operate with a fixed budget established annually a priori by the govemment. New infrastructure is financed à fonds perdu by the govemment, while maintenance and depreciation are financed by the Dutch Railways.

In recent years, there is increasing pressure to have again a commercial exploitation of the railway system (including financing on the open capita1 market). Therefore, the govemment has decided to stop subsidizing the operation of infrastructure, although per link subsidies might be given by contract. The infrastructure will become the responsibility of the government; therefore, the government will finance and maintain the infrastructure. The railway company will have to pay a user charge when the profitability becomes sufficient.

3.3 Roads

As mentioned above, horse drawn carriages and later on automobiles made up the main vehicles on road infrastructure. The strong competition between various types of transport led at the end to a winning position of the private car.

The drastic expansion of road infrastructure parallelled this growth of private transport.

Drastic investments in road infrastructure started essentially at the beginning of this century (Bierman et al., 1982). The government took the responsibility to finance road infrastructure, the revenues were mainly collected from road taxes, vehicle taxes and genera1 taxes. Private financing of roads has never become a major activity; only a few bridges and tunnels have been privately financed and operated, although in recent years there is an increasing tendency to expand the number of privately financed infrastructural options (see Section 4).

3.4 Concluding remarks

The operation and financing of infrastructure can be analyzed by applying the analysis of Section 2.3 (see Table 1).

Table 1 Features of the jïnancing and operation of Dutch infrastructure

	Private operation	Private financing	Risks for private sector	User charges [1]
Waterways				
* before 1800	+/-			+
* 1800-1850[2]	+	+/-	+/-	+
* after 1850				
Railways				
* before 1860	+	+	+	+
* 1860-1890	+		+	+
* 1890-1948	-kJ-		+/-	+/-
* 1948-1994	+/-			
* after 1994[3]	+		+	+/-
Roads				

Note: 1) In the case of railways user charges paid by the railway companies are meant.
2) Differs per project; the main case is presented.
3) This presents the situation as proposed; the system is not entirely introduced yet.

It appears that the role of the govemment has been fluctuating between abstention, dominant involvement and encouragement of private initiatives. A similar pattern is for example also found in the UK (Banister et al., 1995). Apparently, the policy life cycle of infrastructure financing in the Netherlands is following the budget cycle, This means that the gradual decline of private infrastructural initiatives may soon turn into a greater impact of the private

sector on financing and operation of various infrastructure modes. An other interesting observation is that the railway infrastructure is operated in the most commercial way, while the road infrastructure always has been the responsibility of the public sector. A main reason for this may be that the number of vehicles on the railway infrastructure is limited, which makes levy ing charges cheaper and easier. However, this situation may give the railways a competitive disadvantage vis-à-vis competing modes.

It appears that private financing of infrastructure occurred only in the first stage of railway construction and partly in the beginning of the large waterway projects. When this occurred, the conditions of Section 2.3 are met; the private sector ran sufficient risks and user charges were levied to cover the costs of the investment.

Interestingly, financing and operation schemes of the nineteenth century are proposed nowadays in several countries. This holds especially for the railways, where several types of concessions have been applied. It may be very useful to leam from the experiences of the past.

4 A Cross-European Overview of Privately Financed Projects

Since 1945 almost all European transport infrastructure has been financed and operated by govemments or by public organisations tied to the govemment. Especially in the case of railways, there is at present a trend to separate the financing and operation of infrastructure, as is the case in Sweden, Switzerland and the United Kingdom (Category 11 in Figure 1) (Hannson and Nilsson, 1991; Nash, 1993). In this model, the management and financing of infrastructure is the responsibility of the govemment, while the operation takes place on a private basis, where the operator imposes user charges. In this situation there may be several suppliers of transport services, which allows competition. This model corresponds to recent EU regulations and is proposed or under discussion in several countries (Germany, Italy , Netherlands). In the UK, there are also plans to privatise the rail infrastructure owner (Railtrack).

Road infrastructure is mostly the responsibility of the public sector however, although there are in several countries discussions about introducing toll or road-pricing systems. In Sweden the official policy aims at introducing the same construction for road infrastructure as for rail infrasttucture (Hannson and Nilsson, 1991). Because of the above-discussed Mannheim treaty, also waterways have been f'inanced by the public sector.

However, there are several projects which have been financed and/or operated by the private sector. In this section an overview will be presented of several major projects which have (partly) been financed and operated by the private sector. The description will focus on the concession and financing arrangements and not on exact figures.

The Channel Tunnel

The Channel Tunnel is the first fixed link between France and the UK, which was opened in 1994 (Marcou, 1993; Vickerrnan, 1995). The tunnel is only meant for trains, which also transport cars. The Channel tunnel has been financed entirely by private financiers and the Channel tunnel is one of the few projects which is for a large part financed by stocks; most projects are (almost) entirely financed by loans. The concession is granted for 55 years, while in the concession it is stated that until 2020 no other fixed links will be constructed; in this way there will be no new competitors. Both the French and British governments have no influence on the tariffs, so the operator is free in setting the tariffs. The railway companies have granted the use of at least 50% of the capacity of the tunnel, however. Also the infrastructure to and from the tunnel has been or will be financed by govemments or the railway companies.

The costs of the tunnel were much larger than expected, and as a result the Eurotunnel company has serious financial problems. Also the construction took longer than expected, which again increased the interest and other costs. Although the concession and financing have been the responsibility of the private sector, the support (also financial) of both the French and British government has been large (Marcou, 1993).

The Great Belt link and Oresund link

The Great Belt link is the fixed link in Denmark between Seeland and Jutland, it will be both a road and a rail link. The rail link will be ready first, so that the railways will be able to gain a large market share. The link is financed entirely by loans, which are granted by the govemrnent (Kolk et al., 1991), so that in the end the govemment runs the financial risks. The govemment also owns the company which finances and operates the links. It is planned that the road link is paid back in 15 years (by tolls); the rail link should be paid back in 30 years. However, there have been serious delays during the construction, and as a result also the costs have become much higher than expected. Therefore, the time between opening of the rail and road link is shorter and the pay-back periods may be larger as expected beforehand.

ventures of governments and private parties. The government does not guarantee all loans of the SEM's, but the influence of the government is large. For example, the tolls, losses and profits are equalized and redistributed by a holding. As a result the risks are not very high for the private financiers. In the 1960s, there were several entirely private companies operating the highways; however, these turned into SEM's except one: the Cofiroute is stil1 operated by a private company, although it is partly subsidized by the government. The project was very profitable; however, the French government obliged the company to reinvest these profits in new infrastructure. As a result, the company runs at a loss (Banister et al., 1995).

Dutch Tunnels

In the Netherlands the Tunnel under the Noord (near Rotterdam) has been opened in 1982. This tunnel has been financed for *f*300 mln (which is about 60%) by private financiers, while the government financed the remainder. In this way the govemment ran the construction risks of higher costs and delays. Also the 'competing' bridge over the North was included in the agreement. When the contracts were signed, an electtonic road pricing system was planned in the Dutch Randstad; therefore, the consortium should receive the fees of the tunnel and the bridge. However, these plans were postponed so that the government pays now a fee out of the government budget to the consortium per passing vehicle.

For a second tunnel (Wijkertunnel near Amsterdam) an contract with about the same conditions has been signed. Recently, it appeared that this financing construction is very expensive for the govemment in the long run. As a result this way of financing is not expected to be applied for other projects.

4.3 Concluding remarks

The main characteristics are summarized in Table 2. Striking is that all projects in the UK are entirely privately financed and operated. In the other countries the govemment influence is larger. Striking is that the Dutch tunnels are the only projects which are not levying user charges to the car drivers. The conditions for economically useful projects are therefore not met for the Dutch tunnels, the Great Belt link and the SEM's in France.

An equal project has been started for the Oresund link between Denmark and Sweden. The conditions are about equal to the Great Belt link, the loans are granted by the Danish and Swedish government.

The Mont Blanc tunnel

The Mont Blanc tunnel is a road link between France and Italy and was opened in 1966. The tunnel has several stakeholders; about 70% of the French company and 50% of the Italian company is owned by national, regional and local govemments, while the remainder is owned by private financiers. The concession period is 70 years; the tolls are regulated by the government. Because of the large unexpected mobility growth, the tunnel was very profitable, although the tunnel was twice as expensive as expected. Because of the large profits, the government forced the consortium to finance a second tunnel (the Fréjus-tunnel) and to finance the infrastructure from and to the tunnel. This reduced the profitability. Despite this, all loans were paid back in 1982 and the tunnel is very profitable for the financiers (ECMT, 1990).

The Dartford Bridge

The Dartford Bridge is the tunnel over the Thames and is next to two tunnels the third main link on the route. In the concession agreement also the operation of these two tunnels has been included. The concession is granted for 20 years; however, when the loans are paid back earlier, the bridge will be handed over to the govemment, so that 'excessive profits' are not possible. The bridge is entirely financed by private capital. An equal construction has been applied for the Second Sevem Crossing bridge between Wales and Southem England (ECMT, 1990).

The Birmingham Northern Relief Road (BNRR)

The BNRR is the first road in the UK to be financed and operated privately, without any guarantees of the govemment. It will also be the first tolled highway in the UK. The company is allowed to set the tolls without approval of the govemment. This is justified by the govemment because the competing roads will stay toll free, which reduces the freedom of the operator. The concession is granted for 53 years (Banister et al., 1995).

French Highways

Levying tolls in combination with private financing is usual in France. Most infrastructure is financed by Société d' Economie Mixtes (SEM), which are joint

Table 2 Features of the financing and operation of European infrastructure projects

	Private operation	Private financing	Risks for private sector	User charges
Channel tunnel	+	+	+	+
Great Belt link	+/- [1]	+		+
Mont Blanc tunnel	+/- [1]	+/- [2]	+	+
Dartford Bridge	+	+	+	+
BNRR	+	+	+	+
French Highways				
* SEM's	+/- [1]	+	+/-	+
* Cofiroute	+	+	+	+
Dutch tunnels	+	+/- [2]	+	

Notes: 1) The project is operated by a joint-venture.
2) The project is financed only partly by private capital.

Several characteristics of these above discussed projects can be identified:

* most projects are 'missing links' in a network (Channel Tunnel, Mont Blanc bridge) and as a result there is a kind of monopoly position, which guarantees a certain leve1 of demand. When this is not the case, a monopoly position is often created by contract (Dartford Bridge, Tunnel under the Noord; for the Channel tunnel it is stated that competing links will not be constructed until 2020);
* the private financiers receive mostly guarantees of the govemment for loans. For the Dutch tunnels the government took over even the construction risks;
* many projects are more expensive than expected, also because the construction time is longer than estimated beforehand;
* the politica1 risk is often reduced, for example, because the govemments participate in the consortia. Often the projects are linking two countries, which makes it more difficult for one of the govemments to interfere.
* the influence of governments is stil1 large in all projects.

It can be concluded that most infrastructure is stil1 financed and operated by govemments, while - except maybe the United Kingdom - the influence on privately financed and operated projects is stil1 large.

5 Conclusions

The interests of the private sector clearly differ from that of the public sector. As a result, transport infrastructure is not a good which can be easily provided by the private sector. Governments have several reasons to take the responsibility and have influence on the provision of infrastructnre in order to secure equity objectives (e. g . , isolated regions or mobility-deprived people), to reduce negative external effects and to achieve positive extemal effects. However, there are reasons to consider private financing and operation of infrastructure:

* the private sector may provide, construct and maintain the infrastructure more efficient;
* the acceptance of user charges may be higher, because a private company is the owner;
* it reduces govemment expenditnres and may in this way help to achieve financial policy objectives; in this way the project may also be constructed earlier .

From the historica1 analysis in the Netherlands it becomes clear that entirely private provision is not feasible. Networks will not come into existence, because several links are not profitable or too risky for private financiers. Therefore, the generation of network synergy will be more difficult, especially when there are several suppliers. Interestingly, certain operational and financing constructions which are currently under discussion in several European countries for the railways have been applied in the Netherlands in the past. Shifts in societal views on the importance, effectiveness and acceptance of market incentives appear to change over time; therefore, in the 1960s and 1970s the govemment took most responsibility for the operation and financing of railway infrastructure. In recent years however, the earlier applied constructions seem to be introduced once again. It should be acknowledged that these views are in the first place important for the private operation of infrastructure projects.

Private financing - which is only feasible when the private operation generates sufficient income - seems nowadays only possible for specific projects, since the most profitable links are already constructed. The govemment will - and should - be largely involved- in these projects however, because of the above mentioned reasons. Problems are fust found in the estimation of the construction costs and the construction time. It is striking that in almost all discussed projects these estimations were wrong, so that the costs were much higher ‘as

expected beforehand. Governments should reduce especially politica1 risks to a maximum extent, for example, by clear clauses in the concession agreement. However, an important condition is that the government does not take over all risks, otherwise the project becomes only more expensive for governments in the long run while there are no efficiency gains.

In conclusion, when certain conditions are met, private financing of transport infrastructure may be an attractive altemative for conventional public funding. Private financing may in this way contribute to the efficiency and productivity of an economy .

References

Andersen, B., 1995, Franchising Alternatives for European Transport, in: D. Banister R. Capello and P. Nijkamp (eds.), ***European Transport and Communications Networks*** , John Wiley , Chichester, pp. 22 1-247.

Banister, D., B. Andersen and S. Barrett, 1995, Private Sector Investment in Transport Infrastructure in Europe, in: D. Banister, R. Capello and P. Nijkamp (eds .), ***European Transport and Communications Networks*** , John Wiley, Chichester, pp. 191-219.

Bierman, A.K., P.J.H.M. Hol and J.R. Verdius, 1982, ***Over Wegen en Overwegen,*** Siswo-publication 239, Amsterdam.

Coase, R.H., 1988, ***The Firm, the Market and the Law***, The University of Chicago Press, Chicago.

ECMT (European Conference of Ministers of Transport), ***1990, Private and Public Investment in Transport,*** Paris.

Fokkema, T., and P. Nijkamp, 1994, The Changing Role of Govemments: The End of Planning History?, ***International Journal of Transport Economics ,*** vol. 21, no. 2, pp. 127-145.

Hannson, L., and J.E. Nilsson, 1991, A New Swedish Railrcad Policy: Separation of Infrastructure and Traffic Production, ***Transportation Research*** A , vol. 25, no. 4, pp. 153-159.

Jonckers Nieboer, R.H., 1938, ***De Geschiedenis van de Nederlandse Spoorwegen,*** 1832-1928, Nijgh & Van Ditmar, Rotterdam.

Kolk, H.L. van der, F.C. Kuik and R. Onverzaagt, 1991, ***De Relatie Overheid-NS in Europees Perspectief,*** 100, The Hague.

Marcou, G., 1993, Public and Private Sectors in the Delivery of Public Infrastructure: The Case of the Channel Tunnel from an International Perspective, ***Environment and Planning C,*** vol. 11, no. 1, pp. 1-18.

Nash, C., 1993, Rail Privatisation in Britain, ***Journal of Transport Economics and Policy,*** vol. 27, no. 3, pp. 317-322.

Nijkamp, P., and S.A. Rienstra, 1995, Private Sector Involvement in Financing and Operating Transport Infrastructure, ***Annals of Regional Science,*** vol. 29, no. 2, pp. 221-235.

Nijkamp, P., and S.A. Rienstra, 1996, The Public Private Nexus in Financing Infrastructure Investment, in: K. Button, P. Nijkamp and H. Priemus (eds.), ***European Transport Networks*** , Edward Elgar, London (forthcoming).

Tijn, Th. van, and W.M. Zappey, 1979, De Negentiende Eeuw 1813-1914, in: J.H. van Stuijvenberg (ed.), ***De Economische Geschiedenis van Nederland,*** Groningen.

Vickerman, R., 1995, The Channel Tunnel: The Case for Private Sector Provision of Public Infrastructure, in: D. Banister (ed.), ***Transport and Urban Development*** , E & FN Spon, London, pp. 96-122.

Vries, J. de, 1981, ***Barges and Capitalism,*** HES Publishers, Utrecht.